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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

MACKEY, TERRENCE M

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 05/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/028,955

Applicant(s)

BERNARDS ET AL.

Examiner

Terrence Mackey

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1 - 20 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 10, 12, and 13 – 20 are rejected under 35 USC 103 (a) as being unpatentable over Ferrier (6,162,503).

Claim 1 of applicant's inventive process recites a process for preparing a roughened copper surface comprising the steps of contacting a clean copper surface with an adhesion promoting composition consisting essentially of (1) hydrogen peroxide, (2) a pH adjuster, (3) a topography modifier, and (4) a uniformity enhancer, and at least essentially free of halogen ions. The Examiner notes that applicant recites the use of tetrazoles for use as the uniformity enhancer in applicant's adhesion enhancing composition. The Examiner also notes that applicant recites the use of five-member aromatic fused N-heterocyclic ring compounds as suitable topography modifiers, with 1H-benzotriazole, 1H-indole, 1H-indazole, and 1H-benzotriazole given as examples of suitable compounds to be used as the topography modifier. Claims 13 – 20 of applicant's inventive process recite a process for preparing a roughened copper surface by contacting a clean copper surface with an adhesion promoting composition consisting essentially of (1) an oxidizer, (2) an acid, (3) a topography modifier, and (4) a coating promoter. Claims

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15-20 additionally include a step of bonding a dielectric material to the copper surface following treatment with the adhesion-promoting composition.

Ferrier '503 teaches a roughening process for copper surfaces to increase the adhesion of a polymeric material to the copper surface by contacting the copper surface with an adhesion promoting composition comprising an oxidizer, an acid, a corrosion inhibitor, a benzotriazole with an electron withdrawing group in the 1-position which is a stronger electron withdrawer than a hydrogen group, and optionally a source of adhesion enhancing species. Ferrier discloses the use of hydrogen peroxide as a preferred oxidizer (column 5, lines 15-21) and sulfuric acid as a preferred acid (column 5, lines 25-28). Ferrier teaches the use of triazoles, benzotriazoles, tetrazoles, imidazoles, benzimidazoles, and mixtures of the foregoing as suitable corrosion inhibitors (column 5, lines 32-37). The process cycle listed on column 7, lines 10-20, describe the use of a soak and predip steps prior to the use of the adhesion enhancing composition. Ferrier also claims the subsequent bonding of a polymeric material to the treated copper surface (see claim 10 and reference the entire specification). Ferrier does not teach modifying the pH of the adhesion enhancing composition, however it is seen as within the scope of one of ordinary skill in the art to optimize the pH of the adhesive enhancing composition through routine experimentation within the broad range of acid concentration taught by Ferrier.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the adhesion enhancing composition of Ferrier '503 wherein the amount of inorganic acid added is used to adjust the pH of the adhesion enhancing composition.

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Claims 3- 9 are rejected under 35 USC 103 (a) as being unpatentable over Ferrier '503 in view of Adlam et al. (5,861,076).

Ferrier '503 teaches the above recited process for roughening a copper surface with an adhesion-promoting composition comprising hydrogen peroxide, inorganic acid, and at least two different azole compound corrosion inhibitors wherein at least one corrosion inhibitor is an hydroxy-substituted azole compound, and wherein the composition comprises up to 6ppm of chloride ion. Ferrier '503 does not teach contacting the uniform roughened copper surface with a post-dip solution comprising an azole or silane compound or a mixture thereof.

Adlam et al. teach the use of coupling agents for improving the bonding of roughened copper surfaces to a resinous substrate. Suitable coupling agents include methacrylamide functional amines, and titanium and zirconium containing derivatives thereof (column 9, lines 15-44).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the silane coupling compositions as taught by Adlam et al. following the treatment of the copper surface with the adhesion enhancing composition of Ferrier '503 to provide a treated copper surface having improved adhesion characteristics.

Claim 11 is rejected under 35 USC 103 (a) as being unpatentable over Ferrier '503 in view of Bishop et al. (6,284,309).

Ferrier '503 teaches the above recited process for roughening a copper surface with an adhesion-promoting composition comprising hydrogen peroxide, inorganic acid, and at least two different azole compound corrosion inhibitors wherein at least one corrosion inhibitor is an

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hydroxy-substituted azole compound, and wherein the composition comprises up to 6ppm of chloride ion. Ferrier '503 does not teach the inclusion of a copper salt in the adhesion promoting composition.

Bishop et al. teach a method for producing a copper surface with improved bonding properties by contacting the copper surface with a solution comprising an oxidizing agent, an acid, a copper complexing agent, and a copper complex. The copper complexing agent and the copper complex are present in an amount sufficient to precipitate copper from the solution onto the copper surface.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the copper complexing agent and copper complex as taught by Bishop in the adhesion enhancing composition of Ferrier '503 to provide improved adhesion properties of the treated copper surface.

Conclusion

Remaining references cited of interest to show the state of the art for preparing roughened copper surfaces for enhancing adhesion to polymeric materials in multilayer laminates.

No claim is allowed.

The Examiner notes that Table 1 lacks comments and results for examples 5 and 6 for which it is requested that the Applicant supply the missing information.

Papers relating to this application may be submitted to Technology Sector 1700 by facsimile transmission. Papers should be faxed to Crystal Plaza 3, Art Unit 1765, using fax number (703) 305-6357. All Technology Section 1700 fax machines are available to receive

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transmissions 24 hrs/day, 7 days/wk. Please note that the faxing of such papers must conform to the Notice published in the Official Gazette, 1096 OG 30, (November 15, 1989).

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Terrence Mackey whose telephone number is (703) 305-5504. The Examiner can normally be reached Monday - Friday from 7:00 AM - 4:30 PM.

If attempts to reach the Examiner by telephone are unsuccessful, the examiner's supervisor, Ben Uteck, can be reached at (703) 308-3836.

Any inquiry of a general nature or relating to the status of this application should be directed to the receptionist whose telephone number is (703) 308-0661.

TMM

May 06th, 2003



ROBERT KUNEMUND
PRIMARY EXAMINER